

REMARKS

In the non-final Office Action, dated October 19, 2006, the Examiner objected to the title of the invention; rejected claims 1-13, 15 and 37 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite; rejected claims 1-3, 15 and 37 under 35 U.S.C. § 103(a) as allegedly being unpatentable over JP 05-090,989 (hereinafter TOKUO) in view of U.S. Patent No. 3,821,738 (hereinafter "QUESINBERRY"); rejected claim 5 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of U.S. Patent Application No. 2003/0092380 (hereinafter "SOLIMAN"); rejected claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of U.S. Patent No. 3,704,464 (hereinafter "DRANE"); rejected claim 7 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of U.S. Patent No. 6,988,049 (hereinafter "WIRTZ"); rejected claims 8-10 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of U.S. Patent No. 6,987,745 (hereinafter "BRUZZONE"); rejected claim 11 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and BRUZZONE and further in view of SOLIMAN; and rejected claim 14 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of WIRTZ. Applicant notes with appreciation the Examiner's indication of allowable subject matter in claims 4, 12 and 13.

By way of this amendment, Applicant has amended claims 1, 7, 14, 15 and 37 to improve form. Claims 13, 16-36 and 38-40 have been canceled without prejudice or disclaimer. Dependent

claim 13 has been re-written into independent form as new claim 41. No new matter has been added by way of the present amendment. Claims 1-12, 14, 15, 37 and 41 are currently pending in the application. Reconsideration of the outstanding rejection of pending claims 1-12, 14, 15 and 37 is respectfully requested in view of the amendments above and the following remarks.

In paragraph 2, the Office Action objects to the title of the invention as not being descriptive. Applicant has amended the Title of the Invention to the following: "Systems and Methods for Translating a Vector Between a Reference Communication Station and a Target Communication Station in a Global Coordinate System to a Local Coordinate System that is Referenced to the Reference Communication Station." In view of this amendment, withdrawal of the objection to the Title of the Invention is requested.

In paragraph 3, the Office Action rejects claims 1-13, 15 and 37 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. In rejecting these claims, the Office Action asserts that the term "vector" in these claims is "not clearly defined in the claim, because there are many other vectors" that exist "between a reference vehicle and a target vehicle." Applicant respectfully disagrees with the Office Action, and asserts that the term "vector" is a term that would clearly be understood by one skilled in the art and is not indefinite. However, solely for the sake of expediting prosecution, and reducing issues of contention with the Examiner, Applicant has amended claims 1, 15 and 37 to recite a "line of sight vector" as suggested by the Examiner. In view of these amendments to improve form, Applicant respectfully requests that the rejection of claims 1-3, 15 and 37 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 4, the Office Action rejects claims 1-3, 15 and 37 under 35 U.S.C. § 103(a) as allegedly being unpatentable over JP 05-090989 (hereinafter TOKUO) in view of U.S. Patent No. 3,821,738 (hereinafter "QUESINBERRY"). Applicants respectfully traverse and submit that the Office Action has failed to establish a *prima facie* case of obviousness.

The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention always rests upon the Examiner. In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). As one requirement for establishing a *prima facie* case of obviousness, the reference (or references when combined) cited by the Office Action must teach or suggest all of the claim features. *In re Vaeck*, 947 F.2d 488, U.S.P.Q.2d 1438 (Fed. Cir. 1991). See M.P.E.P. § 2143. Applicant respectfully submits that the references cited by the Office Action, either singly or in combination, do not teach or suggest each and every feature of claims 1-3, 15 and 37.

Amended independent claim 1, for example, recites a method of communicating with a target vehicle that includes "determining a line of sight vector (\vec{v}) between a reference vehicle and a target vehicle in a global coordinate system," "translating the vector (\vec{v}) into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector ($\vec{i}_{\vec{v}_{local}}$)" and "performing at least one of antenna selection, antenna steering and antenna gain calculation, based on the translated vector ($\vec{i}_{\vec{v}_{local}}$), to communicate with the target vehicle via at least one antenna."

In rejecting claim 1, the Office Action (pg. 3) admits that TOKUO does not disclose or suggest the feature "translating the vector (\vec{v}) into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector ($\vec{i}_{\vec{v}_{local}}$)." The Office Action, however, relies on

column 6, line 47-59 and Equations 4 and 5 of QUESINBERRY for allegedly disclosing this feature. Applicant respectfully traverses and submits that this section of QUESINBERRY, or any other section of QUESINBERRY for that matter, does not disclose or suggest this feature of claim 1.

At column 6, lines 47-59, QUESINBERRY discloses:

As will hereinafter become apparent, the transformation of an angular quantity from the beam line-of-sight axes system to the aircraft axes system requires a transformation which takes into account both the angular relationships of equations (1) and (2) and the derotation affect of equation (3). When these affects are combined into one transform, hereinafter referred to as the T transform, the only angular quantities required are the angles to be transformed and the reflector position angles A_d and E_d . Thus the target line-of-sight direction cosine errors ϵ_A and ϵ_E previously discussed may be transformed into direction cosine errors T_x , T_y and T_z - referenced to the aircraft axes as follows:

$$\begin{bmatrix} T_x \\ T_y \\ T_z \end{bmatrix} = [T] \begin{bmatrix} 0 \\ \epsilon_A \\ -\epsilon_E \end{bmatrix} \quad (4)$$

$$[T] = \begin{bmatrix} (2 \cos^2 A_d) & -(\cos^2 E_d \sin 2A_d) & (\cos A_d \sin 2E_d) \\ (\cos^2 E_d \sin 2A_d) & -(2 \cos^2 E_d \sin^2 A_d - 1) & (\sin A_d \sin 2E_d) \\ (-\cos A_d \sin 2E_d) & (\sin A_d \sin 2E_d) & (\cos 2E_d) \end{bmatrix} \quad (5)$$

The error signals ϵ_A and ϵ_E , disclosed in the section of QUESINBERRY above as being transformed into error signals T_x , T_y and T_z referenced to the aircraft axes, is further disclosed in column 4, lines 34-57 of QUESINBERRY:

Assuming that a portion of the beam strikes the target 40, energy is reflected to the antenna 12 and is directed to the receiver portion in the transmitter/receiver unit 14.

The tracking error detector 16 then utilizes the signal reflected from the target 40 to generate azimuth and elevation angle tracking errors ϵ_A and ϵ_E , respectively. The quantities ϵ_A and ϵ_E represent the angular error between the centerline or the line-of-sight 38 of the transmitted beam and the line-of-sight 42 to the target 40.

The error signals ϵ_A and ϵ_E from the tracking error detector 16 may be applied to the computer 22 and there utilized, in conjunction with aircraft attitude information from the aircraft attitude signal generator 20 and reflector position information from the antenna drive unit 18, to generate reflector error signals ϵ_{Ad} and ϵ_{Ed} . The error signals ϵ_{Ad} and ϵ_{Ed} may then be applied to the antenna drive unit 18 to position the twist reflector 28 in azimuth and elevation, respectively, such that the angular azimuth and elevation errors between that beam line-of-sight 38 and the target line-of-sight 42 are eliminated.

As disclosed in this section of QUESINBERRY, the error signals ϵ_A and ϵ_E , disclosed in column 6, lines 47-59 as being transformed into error signals T_x , T_y and T_z referenced to the aircraft axes, consist of angle tracking errors that represent an angular error between the line-of-sight 38 of a transmitted beam and the line-of-sight 42 to the target 40 (see also ϵ_A and ϵ_E in FIGS. 1 and 2a). As further disclosed in column 5, lines 61-64 of QUESINBERRY, the angle tracking errors ϵ_A and ϵ_E may further be used to represent a deviation of a unit vector u from a zero tracking error position. Column 6, lines 47-59 of QUESINBERRY, therefore, merely discloses the generation of error signals, representative of an angular error between the line-of-sight 38 of a transmitted beam and the line-of-sight 42 to the target 40, and transformation of those angular errors into an error vector T that is referenced to the aircraft axes, where the error vector T represents a deviation of a unit vector u from a zero tracking position. The error vector T of QUESINBERRY, thus, represents an angular error that has been transformed into a vector that is referenced to an aircraft axes, and clearly does not represent a line of sight vector between a reference vehicle and a target vehicle that is transformed from a global coordinate system into a vehicle coordinate system. The section of

QUESINBERRY relied on by the Office Action, therefore, does not disclose, or even suggest, the translation of a line of sight vector between a reference vehicle and a target vehicle in a global coordinate system into a vehicle coordinate system that is referenced to the reference vehicle, as recited in amended claim 1. Since neither QUESINBERRY nor TOKUO disclose this feature of amended claim 1, the Office Action has failed to establish a *prima facie* case of obviousness. Withdrawal of the rejection of claim 1 is, therefore, respectfully requested.

Claims 2 and 3 depend from claim 1. Withdrawal of the rejection of these claims is requested for at least the reasons set forth above with respect to claim 1.

Independent claim 15 recites similar features to (though possibly having different scope than) the features of claim 1. Withdrawal of the rejection of claim 15 is requested for similar reasons to those set forth above with respect to claim 1.

Independent claim 37 recites similar features to (though possibly having different scope than) the features of claim 1. Withdrawal of the rejection of claim 37 is requested for similar reasons to those set forth above with respect to claim 1.

In paragraph 5, the Office Action rejects claim 5 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of SOLIMAN. The Office Action relies on SOLIMAN for allegedly disclosing a “phased array antenna.” Applicant submits, however, that the disclosure of SOLIMAN does not remedy the deficiencies in the disclosures of TOKUO and QUESINBERRY noted above with respect to claim 1, from which claim 5 depends. Withdrawal of the rejection of claim 5 is, therefore, requested for at least the reasons set forth above with respect to claim 1.

In paragraph 6, the Office Action rejects claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of U.S. Patent DRANE. The Office Action relies on DRANE for allegedly disclosing “antenna steering...” Applicant submits, however, that the disclosure of DRANE does not remedy the deficiencies in the disclosures of TOKUO and QUESINBERRY noted above with respect to claim 1, from which claim 6 depends. Withdrawal of the rejection of claim 6 is, therefore, requested for at least the reasons set forth above with respect to claim 1.

In paragraph 7, the Office Action rejects claim 7 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of WIRTZ. The Office Action relies on WIRTZ for allegedly disclosing a “global coordinate system” that includes a “World Geodetic System (WGS)” or a “Military Grid Reference System (MGRS).” Applicant submits, however, that the disclosure of WIRTZ does not remedy the deficiencies in the disclosures of TOKUO and QUESINBERRY noted above with respect to claim 1, from which claim 7 depends. Withdrawal of the rejection of claim 7 is, therefore, requested for at least the reasons set forth above with respect to claim 1.

In paragraph 8, the Office Action rejects claims 8-10 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of BRUZZONE. With respect to claim 8, the Office Action relies on BRUZZONE for allegedly disclosing the determination of “a unit gravity vector in the vehicle coordinate system.” Applicant submits, however, that the disclosure of BRUZZONE does not remedy the deficiencies in the disclosures of TOKUO and QUESINBERRY noted above with respect to claim 1, from which claim 8 depends.

Withdrawal of the rejection of claim 8 is, therefore, requested for at least the reasons set forth above with respect to claim 1.

With respect to claim 9, the Office Action further relies on BRUZZONE for allegedly disclosing the determination of “unit magnetic field vector.” Applicant submits, however, that the disclosure of BRUZZONE does not remedy the deficiencies in the disclosures of TOKUO and QUESINBERRY noted above with respect to claim 1, from which claim 9 depends. Withdrawal of the rejection of claim 9 is, therefore, requested for at least the reasons set forth above with respect to claim 1.

With respect to claim 10, the Office Action also relies on BRUZZONE for allegedly disclosing “converting the unit magnetic field vector to create a unit vector.” Applicant submits, however, that the disclosure of BRUZZONE does not remedy the deficiencies in the disclosures of TOKUO and QUESINBERRY noted above with respect to claim 1, from which claim 10 depends. Withdrawal of the rejection of claim 10 is, therefore, requested for at least the reasons set forth above with respect to claim 1.

In paragraph 9, the Office Action rejects claim 11 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and BRUZZONE and further in view of SOLIMAN. The Office Action also relies on SOLIMAN for allegedly disclosing “determining a unit vector in the east direction.” Applicant submits, however, that the disclosure of SOLIMAN does not remedy the deficiencies in the disclosures of TOKUO, QUESINBERRY and BRUZZONE noted above with respect to claim 10, from which claim 11 depends. Withdrawal of the rejection of claim 11 is, therefore, requested for at least the reasons set forth above with respect to claim 10.

In paragraph 10, the Office Action rejects claim 14 under 35 U.S.C. § 103(a) as allegedly being unpatentable over TOKUO in view of QUESINBERRY and further in view of WIRTZ. Claim 14 recites similar features to (though possibly having different scope than) the features of claim 7. Withdrawal of the rejection of claim 14 is, therefore, requested for similar reasons to those set forth above with respect to claim 7.

New independent claim 41 includes the subject matter of dependent claim 13, which the Office Action has indicated as being allowable if re-written into independent form. New claim 41, therefore, should be in condition for allowance.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

Applicant believes no fee is due with this response other than as reflected on the enclosed Amendment Transmittal. However, if a fee is due, please charge our Deposit Account No. 18-1945, under Order No. BBNT-P01-247 from which the undersigned is authorized to draw.

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Respectfully submitted,

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